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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,040	08/16/2001	Charles H. Dennison	MI22-1676	4501

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EXAMINER
ROCCHEGIANI, RENZO

ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 09/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/932,040	DENNISON	
	Examiner	Art Unit	
	Renzo N. Rocchegiani	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 5, 8, 10, and 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,081,021 (Gambino et al.).

Gambino et al. disclose forming an insulative mass across a first and second electrical nodes that comprise metals such as aluminum separated by dielectric material laterally adjacent thereto (Fig. 4, and col. 5, lines 15-20). The mass has a pair of opening to uncover the two nodes. (Fig. 5). A dielectric layer, such as silicon nitride about 5 to 200 nm thick (col. 5, lines 25-30), is formed in the opening so as to narrow the openings. (Fig. 6). Two conductive plugs are formed wherein one is in contact with one of the nodes while the other is separated from the node by way of the dielectric layer formed in the via. (Fig. 7-8). The conductive plugs comprise a metal such as aluminum or titanium or copper or tungsten and may comprise multilayer structures. (col. 5, lines 5-15). In patterning the dielectric layer that is deposited in the vias, Gambino et al. disclose the use of a mask. (col. 6, lines 35-42).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 5,233,217 (Dixit et al.).

As stated in paragraph 2, all the limitations of the claims have been met except for teaching that the insulative mass comprises BPSG.

Dixit et al. teach the formation of an antifuse wherein the dielectric layer formed over the nodes is BPSG. (col. 3, lines 1-5).

It would have been obvious to one having ordinary skill in the art to use BPSG for the insulative mass, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

5. Claims 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 5,674,787 (Zhao et al.).

As stated in paragraph 2, all the limitations of the claims have been met except for teaching that the dielectric layer deposited in the vias is SiON and that the node comprises copper.

Zhao et al. teach the formation of plugs wherein the dielectric layer formed within the via is SiON and wherein the node comprises copper. (Abstract)

It would have been obvious to one having ordinary skill in the art to use SiON for the dielectric inside the via and copper for the node, since it has been held to be within

the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

6. Claims 6, 7, 12, 20 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 5,110,754 (Lowrey et al.).

As stated in paragraph 2, all the limitations of the claims have been met except for teaching that the nodes comprise n-type and p-type regions and that the plug is formed with polysilicon.

Lowrey et al. teach the formation of an antifuse wherein the nodes comprise n-type and p-type regions (Fig. 13) and wherein the plug comprises a metal or polysilicon. (col. 4, lines 33-45).

It would have been obvious to one having ordinary skill in the art to use polysilicon for the plugs and to form the node regions of n-type and p-type, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

7. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of in view of U.S. Patent No. 5,110,754 (Lowrey et al.) and in further view of U.S. Patent No. 5,233,217 (Dixit et al.).

As stated in paragraph 6, all the limitations of the claims have been met except for teaching that the insulative mass comprises BPSG.

Dixit et al. teach the formation of an antifuse wherein the dielectric layer formed over the nodes is BPSG. (col. 3, lines 1-5).

It would have been obvious to one having ordinary skill in the art to use BPSG for the insulative mass, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

8. Claims 11 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 5,171,715 (Husher et al.).

As stated in paragraph 2, all the limitations of the claims have been met except for teaching that the node and the plug are a mixture of aluminum and copper.

Husher et al. teach the formation of an antifuse wherein the node and the plug are a mixture of aluminum and copper. (col. 5, lines 1-9 and col. 7, lines 1-9).

It would have been obvious to one having ordinary skill in the art to form the node and plugs of a mixture of aluminum and copper, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

9. Claims 18-19, 24-28, 31, 33, and 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 6,087,677 (Wu).

As stated in paragraph 2, all the limitations of the claims have been met except for specifying that the plug comprises TiN and W.

Wu teaches an antifuse wherein the plug may comprise TiN and W. (col. 1, lines 45-50).

It would have been obvious to one with ordinary skill in the specific art to combine the teachings of Wu to those of Gambino, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

10. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 6,087,677 (Wu) and in further view of U.S. Patent No. 5,674,787 (Zhao et al.).

As stated in paragraph 9, all the limitations of the claims have been met except for teaching that the dielectric layer deposited in the vias is SiON and that the node comprises copper.

Zhao et al. teach the formation of plugs wherein the dielectric layer formed within the via is SiON and wherein the node comprises copper. (Abstract)

It would have been obvious to one having ordinary skill in the art to use SiON for the dielectric inside the via and copper for the node, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

11. Claims 30 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 6,087,677 (Wu) and in further view of U.S. Patent No. 5,110,754 (Lowrey et al.).

As stated in paragraph 9, all the limitations of the claims have been met except for teaching that the nodes comprise n-type and p-type regions and that the plug is formed with polysilicon.

Lowrey et al. teach the formation of an antifuse wherein the nodes comprise n-type and p-type regions (Fig. 13) and wherein the plug comprises a metal or polysilicon. (col. 4, lines 33-45).

It would have been obvious to one having ordinary skill in the art to use polysilicon for the plugs and to form the node regions of n-type and p-type, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

12. Claims 34 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 6,087,677 (Wu) and in further view of U.S. Patent No. 5,171,715 (Husher et al.).

As stated in paragraph 9, all the limitations of the claims have been met except for teaching that the node and the plug are a mixture of aluminum and copper.

Husher et al. teach the formation of an antifuse wherein the node and the plug are a mixture of aluminum and copper. (col. 5, lines 1-9 and col. 7, lines 1-9).

It would have been obvious to one having ordinary skill in the art to form the node and plugs of a mixture of aluminum and copper, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Response to Arguments

13. Applicant's arguments with respect to claims 1-40 have been considered but are moot in view of the new ground(s) of rejection. The examiner has modified the above rejections to cover the newly added limitations. The new piece of prior art found is the patent to Wu, U.S. Patent No. 6,087,677. Because the newly formulated rejection using the new prior art was not necessitated by amendment the examiner has decided not to make this action final.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renzo Rocchegiani whose telephone number is (703) 308-5839. The examiner can normally be reached on Monday through Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached at (703) 308-1323. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318.

RNR

August 22, 2003

MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
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